

1 1. A multiuser DSSS-OFDM multiband of UWB base
2 station communication transmitter comprising:
3 a multiuser encoding and spreading unit;
4 a polyphase-based multiband;
5 a IFFT unit;
6 a filtering unit, and
7 a multiband-based modulation and multicarrier.

8 2. The multiuser DSSS-OFDM multiband of UWB base
9 station communication transmitter of claim 1 wherein said
10 multiuser encoding and spreading unit includes an N-user
11 bitstream, a N-convolution encoder, a N-interleaver, a N-
12 spread multiplier, and a N-user key sequence.

13 3. The multiuser DSSS-OFDM multiband of UWB base
14 station communication transmitter of claim 2 wherein said
15 N-user key sequence is orthogonal each other.

16 4. The multiuser DSSS-OFDM multiband of UWB base
17 station communication transmitter of claim 3 wherein a
18 cross-correlation between one user key sequence and other
19 user key sequences is almost equal to zero value.

20 5. The multiuser DSSS-OFDM multiband of UWB base
21 station communication transmitter of claim 1 wherein said
22 polyphase-based multiband includes ten sample delays,

23 eleven down samples, eleven RAM memories, and one modular
24 counter.

25 6. The multiuser DSSS-OFDM multiband of UWB base
26 station communication transmitter of claim 5 wherein said
27 polyphase-based multiband converts an N length of serial
28 sequence into eleven multiband sequences with a length of
29 $N/11$.

30 7. The multiuser DSSS-OFDM multiband of UWB base
31 station communication transmitter of claim 1 wherein said
32 IFFT unit includes eleven IFFTs in parallel, each of the
33 IFFTs having 24 Nulls and 512 complex inputs to produce
34 1024 real-value output.

35 8. The multiuser DSSS-OFDM multiband of UWB base
36 station communication transmitter of claim 1 wherein said
37 filter unit includes eleven filtering sections, each
38 filtering section having a dual-switch, two transmitter
39 shaped filters, two D/A converters, two analog
40 reconstruction filters, and one bit detector.

41 9. The multiuser DSSS-OFDM multiband of UWB base
42 station communication transmitter of claim 8 wherein said
43 dual-switch contains two switches, one switch of rotating

44 at even number of input positions and another switch of
45 rotating at odd number of input positions.

46 10. The multiuser DSSS-OFDM multiband of UWB base
47 station communication transmitter of claim 8 wherein said
48 bit detector identifies a value of the dual switch output.

49 11. The multiuser DSSS-OFDM multiband of UWB base
50 station communication transmitter of claim 1 wherein said
51 multiband-based modulation and multicarrier includes eleven
52 multiband QPSK modulations controlled by eleven bit
53 detectors, one summation, and one analog bandpass filter.

54 12. The multiuser DSSS-OFDM multiband of UWB base
55 station communication transmitter of claim 11 wherein said
56 each multiband QPSK modulation and multicarrier includes a
57 multi-oscillator, two oscillator switches and one QPSK
58 switch controlled by the bit detector, and one up-carrier
59 multiplier and one down-carrier multiplier.

60 13. The multiuser DSSS-OFDM multiband of UWB base
61 station communication transmitter of claim 12 wherein said
62 multi-oscillator contains four carriers of positive and
63 negative $\sin(2\pi f_i t)$, and positive and negative $\cos(2\pi f_i t)$.

64 14. The multiuser DSSS-OFDM multiband of UWB base
65 station communication transmitter of claim 12 wherein said
66 one of the two oscillator switches connects to either the
67 positive $\cos(2\pi f_i t)$ or the negative $\cos(2\pi f_i t)$; another of the
68 two oscillator switches connects to either the negative
69 $\sin(2\pi f_i t)$ or the positive $\sin(2\pi f_i t)$.

70 15. The multiuser DSSS-OFDM multiband of UWB base
71 station communication transmitter of claim 12 wherein said
72 QPSK switch either connects to the up-carrier multiplier or
73 connects to the down-carrier multiplier.

74 16. A multiuser DSSS-OFDM multiband of UWB mobile
75 communication receiver comprising:
76 a combination section of a multiband multicarrier
77 down converter and demodulation, an A/D unit, and a digital
78 receiver filter unit;
79 a FFT and FEQ section;
80 a polyphase-based demultiband; and
81 a despreading, deinterleaver and decoding
82 section.

83 17. The multiuser DSSS-OFDM multiband of UWB mobile
84 communication receiver of claim 16 wherein said combination
85 section of a multiband multicarrier down converter and
86 demodulation, an A/D unit, and a digital receiver filter

87 unit includes an analog bandpass filter, eleven multiband
88 QPSK down converters and demodulations, twenty-two A/D
89 converters, and twenty-two digital receiver filters.

90 18. The multiuser DSSS-OFDM multiband of UWB mobile
91 communication receiver of claim 16 wherein said each of the
92 multiband QPSK down converters and demodulations include an
93 up-level carrier multiplier of $\cos(2\pi f_i t)$ coupled to an anti-
94 aliasing analog filter and a down-level carrier multiplier
95 of $\sin(2\pi f_i t)$ coupled to an anti-aliasing analog filter.

96 19. The multiuser DSSS-OFDM multiband of UWB mobile
97 communication receiver of claim 16 wherein said FFT and FEQ
98 section includes eleven FFT units and eleven FEQ units.

99 20. The multiuser DSSS-OFDM multiband of UWB mobile
100 communication receiver of claim 19 wherein said each FFT
101 unit has 1024 real-value inputs and produces 500 outputs in
102 the frequency-domain and 12 Nulls.

103 21. The multiuser DSSS-OFDM multiband of UWB mobile
104 communication receiver of claim 19 wherein said each FEQ
105 unit includes 500 equalizers, 500 decision detectors, 500
106 subtracts, and an adaptive algorithm.

107 22. The multiuser DSSS-OFDM multiband of UWB mobile
108 communication receiver of claim 21 wherein said each of
109 equalizers is a linear equalizer with N-tap adjustable
110 coefficients.

111 23. The multiuser DSSS-OFDM multiband of UWB mobile
112 communication receiver of claim 21 wherein said each of the
113 decision detectors is a multi-level threshold.

114 24. The multiuser DSSS-OFDM multiband of UWB mobile
115 communication receiver of claim 16 wherein said polyphase-
116 based demultiband includes a modular counter, eleven RAM
117 memories, eleven up samples, ten sample delays, and a
118 addition.

119 25. The multiuser DSSS-OFDM multiband of UWB mobile
120 communication receiver of claim 24 wherein said polyphase-
121 based demultiband converts eleven multiband input sequences
122 with a length of $N/11$ into a serial output sequence with a
123 length of N .

124 26. The multiuser DSSS-OFDM multiband of UWB mobile
125 communication receiver of claim 16 wherein said
126 despreading, deinterleaver and decoding section includes a
127 despreading multiplier, a user key sequence, a
128 deinterleaver, a Viterbi decoding, and a user bitstream.

129 27. A multiuser DSSS-OFDM multiband of UWB
130 communication system comprises a multiuser DSSS-OFDM
131 multiband of UWB base station communication transmitter and
132 receiver, and N different users of the DSSS-OFDM multiband
133 of UWB mobile communication transmitters and receivers;

134 28. The multiuser DSSS-OFDM multiband of UWB
135 communication system of claim 27 wherein said multiuser
136 DSSS-OFDM multiband of UWB base station communication
137 transmitter and receiver can transmit and receive N
138 different users simultaneously.